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Date: 6 May 2022

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Subject: Missing Move Rt 4

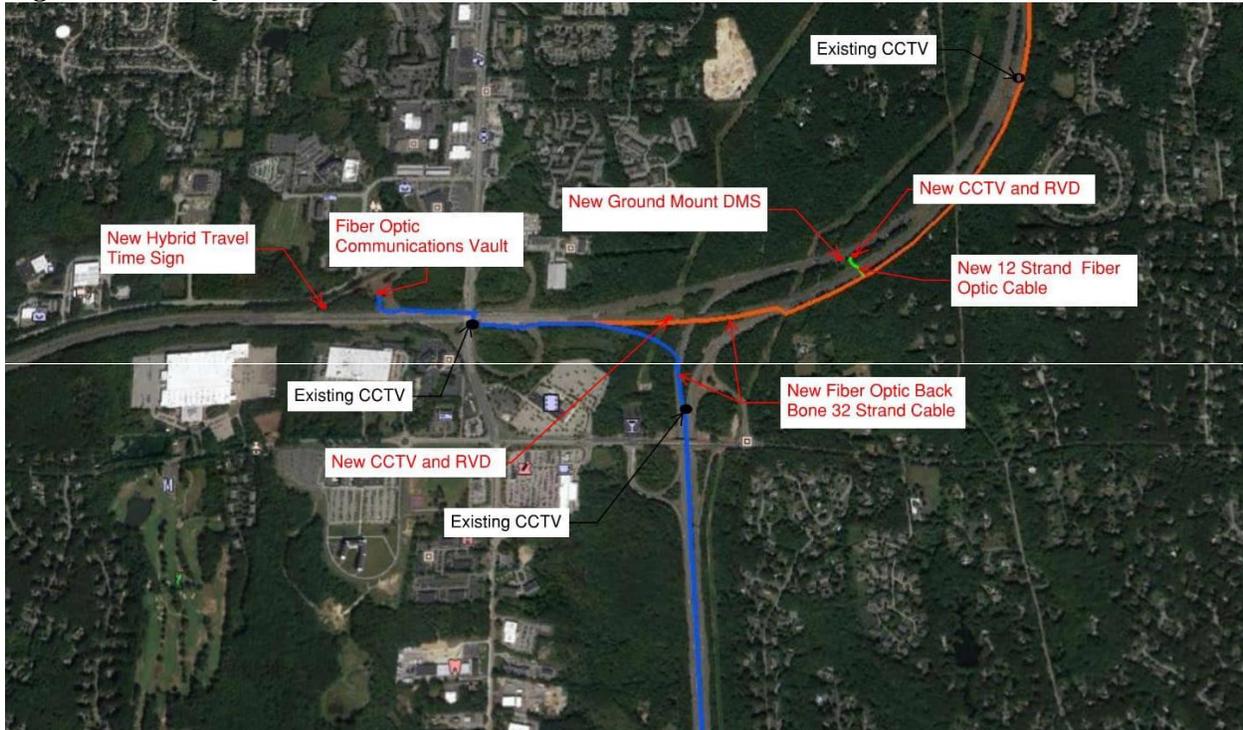
Below are some potentials ITS improvements that would fall within the scope of the “Missing Move” / Quonset Connector Ramps grant application. Based on recommendations that Jacobs previously provided in the 2015 RIDOT ITS Strategic Deployment Plan and more recent trends in ITS design in the state, we have come up with a plan for both the Primary and Secondary Project areas listed in the grant application.

The Primary site located at the Interstate 95 and Route 4 interchange presents a great opportunity for new ITS equipment in the area and the ability to lay the groundwork for expanding future fiberoptic communication availability in this part of the state. The following devices could be installed within the Project Limits:

- **Two new CCTV Cameras** located in the median areas of I-95 to capture the various ramps and movements of the interchange. These could also be collocated with RVDs to capture traffic counts on the movements as well. This ITS equipment would assist in reducing delays related to incident management operations.
- **Rehabilitation of the Existing CCTV** located on the I-95 Cell tower just north of the project limits. This site is one of the only non-IP cameras in the state and needs to be redesigned/relocated to upgraded and reduce maintenance costs.
- **Multiple Hybrid Travel Time and Ground Mounted DMS Signs** could be located in the project limits. Hybrid Travel Time Signs report current travel time to predetermined static destinations to the public (similar to MassDOT’s GoTime signs). A Ground Mounted DMS is more flexible, providing travel times or relevant incident management info as determined by the TMC operators. Hybrid Signs are approximately 1/3 the cost of Ground Mounted DMS.
- **Fiber Optic Infrastructure** including new Fiber Optic conduits and Manholes should be installed along as much of I-95 and Rt 4 as financially feasible. The proposed new ramp represents a unique opportunity to connect these two major roadways in a network and lay the ground work for future expansion of the communication network in all directions. Potentially, communication for all current and future ITS devices in this area could be consolidated to a single comm point (such as the OSHEAN fiber backbone near the Quaker Lane interchange), which would then be backhauled back to the TMC.

The map below shows the proposed locations for each of the ITS items discussed. These locations are contingent on the final design of the new ramp system. See Figure 1 below.

Figure 1 Primary Location ITS Plan



**TABLE 1: Primary Project Area
Proposed ITS Equipment Estimate**

ITS Elements	Estimated Cost
I-95 to Rt 4 Fiber Optic Connections	\$251,000.00
I-95 Fiber Optic Conduit and Manhole	\$381,000.00
2 New CCTV Camera Pole Locations	\$130,000.00
Redesign of Cell Tower CCTV Location	\$68,000.00
Hybrid Travel Time Guide Sign	\$33,000.00
Ground Mounted DMS Sign	\$89,000.00
Work Zone ITS System	\$250,000.00
Ramp Meter	\$189,000.00
Total:	\$1,391,000.00

The Secondary site on Route 403 also has opportunities to expand ITS. The following devices could be installed within the project limits:

- **New CCTV Camera** located northwest of the Davisville Road Exit to facilitate incident management operations in the area. This could be collocated with RVD(s) to capture traffic counts as well.

- **New Westbound DMS** southeast of Davisville Road Exit. This location would allow road users coming from the Quonset Business Park to be notified of any major traffic delays in the area or on Route 4 ahead.
- **Wrong Way Driver System(s)** at the existing Davisville Rd off-ramps from Route 403 may be appropriate based on the history of wrong-way driver incidents in this area.
- **Fiber Optic Infrastructure** in the area including new Fiber Optic conduits and Manholes would allow all new ITS equipment in the area, as well as the existing CCTV at Route 403 @ Route 1 to communicate back to the TMC from one central location. The OSHEAN Network fiber along Rt 1 would provide an improved method for communicating with the TMC. The preliminary plans and estimate for the Secondary location can be seen in Figure 2 below.

Figure 2 Secondary Location ITS Plan



**Table 2: Secondary Project Area
Proposed ITS Equipment Estimate**

ITS Elements	Estimated Cost
New CCTV Camera Pole Location	\$59,000.00
Ground Mounted DMS Sign	\$89,000.00
2 Wrong Way Driver Systems	\$85,000.00
Fiber Optic Connections	\$347,000.00
Total:	\$580,000.00

In addition to those, one new recommendation RIDOT could consider is a ramp metering system at either the **on-ramp to I-95 South from Quaker Lane**, or **on-ramp to Rt 4 / I-95 North from Division St**. I don't believe Rhode Island has ever installed one of these systems, so this could serve as a pilot to test the effectiveness of this technology for future projects.



Figure A: Potential Ramp Metering Location at on-ramp to I-95 South from Rt. 2 / Quaker Lane

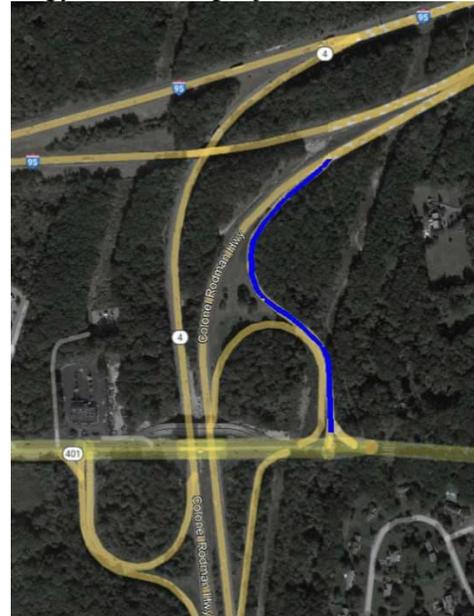


Figure B: Potential Ramp Metering Location at on-ramp to I-95 North from Rt 401 / Division St

In addition, for a project of this size and complexity, we recommend a Smart Work Zone be procured to collect data and keep the public informed of the many traffic pattern changes and overall traffic conditions within the work zone, as well as assist with work zone incident management operations. There are many different technologies which can be customized into a system that meets the specific needs of the Work Zone. For instance, in addition to monitoring the highway portions for congestion and incidents, a Smart Work Zone could be setup to monitor the various approaches to the Rt 4 interchange and local arterial traffic conditions as well (along Rt 401/Division St, Rt 2 / S County Trail, and Rt 2/Quaker Lane).